

machine. Maroon had undergone an almost complete transformation. After famously dismissing Omalu's findings and then waking up to the implications ("Bennet, do you know what this really means?"), he now so embraced the idea of CTE that he was conducting his own research into the disease. That research often combined some of his favorite topics, including the health effects of products such as fish oil and red wine, which Maroon believed could help stave off neurodegenerative disease in the same way he believed they could stave off aging and death.

Maroon was perfectly suited to this next phase of the crisis, which favored entrepreneurship and not a little bit of self-promotion. The diminutive neurosurgeon was never more his father's son than in these moments. Maroon's dad had made his mark in the Ohio Valley providing diversions and respite to miners and travelers: a pack of cigarettes, a pull at a slot machine, a cheeseburger, and a fill-up along the interstate. Maroon, too, would prove himself an expert marketer. ImPACT, the product of his long-ago conversation with Chuck Noll, was, of course, a gold mine. Now, in response to the science he once had resisted, Maroon was endorsing concussion-resistant caps and repurposing his advocacy of wine and chocolate as the secrets to a long and healthy life.

It brought Maroon new adherents to his brand of alternative medicine, along with other attention he hadn't been seeking.

The soaring concern about concussions led to a wave of state regulations designed to protect children, regulations like the Zackery Lystedt Law that Ellenbogen and others had helped pass in Washington and that the NFL had pushed in other states.

One of the first states to adopt the legislation after Washington was New Mexico, and the issue caught the attention of Tom Udall, the state's Democratic senator. Udall, a nephew of 1976 presidential candidate Mo Udall, once had been New Mexico's attorney general. He had used that position to crack down on consumer fraud, going after telemarketers and other scourges. It was that aspect of the burgeoning concussion crisis that Udall thought most needed regulation, because so many of the new products making wild claims were aimed at children and their parents.

Udall was drawn immediately to Riddell's ongoing advertising campaign for the Revolution helmet and the company's claim that the youth line of helmets reduced concussions by 31 percent. The claim, of course, was the by-product of the controversial NFL research now at the heart of the lawsuits. It also stemmed from the notorious UPMC study that had been funded by Riddell and coauthored by the company's vice president of research and development, along with the ImPACT crew: Collins, Lovell, and Maroon. Udall focused on the potential conflicts of interest and the truthfulness of the claims, including the admission by UPMC that Riddell had distorted and misused the results.

Udall sat on the Senate Commerce Committee, which provided oversight of the Federal Trade Commission. He sent a letter to the FTC requesting an investigation, expressing concern "about potential unfair and deceptive practices related to the sale of football helmets, especially those advertised for children's use." The letter included page after page of Riddell advertising—on the company website, in print, on YouTube—boasting that the Revolution helmet line reduced concussions by 31 percent. Udall cited as particularly egregious Riddell's online description of the Revolution Youth helmet, in which the company touted an "extensive long-term study by the University of Pittsburgh Medical Center" as the basis for the claim. The study in fact had never tested the youth version of the NFL-inspired helmet.

"These prominently displayed claims citing a prestigious medical institution and scientific journal give the overall impression that these helmets provide a significant safety improvement over other helmets and that this is strongly supported by research," Udall wrote. "Yet there is actually very little scientific evidence to support the claim that Riddell Revolution helmets reduce the risk of concussion by 31 percent."

The FTC immediately opened an investigation into Riddell and other helmet companies that made similar claims. Udall and his aides thought the Riddell campaign had launched a wave of fanciful claims by companies seeking to capitalize on fears about concussions. "I really look at the UPMC study as what launched this whole era of concussion marketing claims in the area of sports equipment," said one Udall aide. The senator and his staff ultimately would flag dozens of suspicious products. The makers of one mouth guard that Udall targeted,

Brain-Pad, claimed that it could eliminate concussions entirely by creating what it called a “brain safety space.”

Udall regarded Maroon as one of the industry’s worst offenders. In addition to his participation in the flawed Riddell study, Maroon had endorsed a dietary supplement called Sports Brain Guard that purported to “maximize the brain’s ability to heal and reduce inflammation.”

An endorsement from Maroon—described as “part of the NFL’s Traumatic Brain Injury Committee”—ran on the product’s website: “Over the past 30 years, as a practicing neurosurgeon, I have treated thousands of athletes with sports related concussions—players from the NFL, NHL, NBA, NCAA and all the way down to kids playing youth sports. . . . A major consequence of a concussion is inflammation of the brain and the subsequent cascade of biochemical events that results in brain damage. . . . I have personally recommended [this] product, SPORTS BRAIN GUARD, to athletes at all levels following concussions.”

On October 19, 2011, the Senate Commerce Committee gathered for a hearing on “Concussions and the Marketing of Sports Equipment.” At one point, Udall asked Jeffrey Kutcher, an associate professor of neurology at the University of Michigan and chair of the American Academy of Neurology’s sports neurology section, about the truthfulness of the Riddell/UPMC study. Kutcher replied that “there is no significant data” to make the claim that the helmet reduced concussions 31 percent.

“And you can see why a parent who would be concerned about concussions with all the increasing awareness that is out there would see something like this and think, ‘I am going to get a really protective helmet for my child,’ ” said Udall. “And really, what we are talking about is something that is very, very misleading.”

“Well, I can see that, and I do see that every week in my clinic,” said Kutcher. “I see patients coming in with their parents saying they want to buy the new helmet: ‘This is the concussion helmet. What do you think about it?’ That is a very real conversation I have all the time.”

“And they are asking you that question over and over again?” said Udall.

“Correct.”

As for the Maroon-endorsed Sports Brain Guard, Kutcher said:

“There is no data that this type of thing will help prevent concussion at all, really.”

Maroon wasn’t asked to testify. Not surprisingly, he saw it differently when interviewed for this book. Like Lovell, Maroon claimed to have played little role in the Riddell study even though his name was on the paper and he was a cofounder of ImPACT. He remained unapologetic about the products he endorsed, including Sports Brain Guard, which soon was taken off the market amid the controversy. After decades in medicine, Maroon said he truly believed in the healing properties of the products he was touting. In the middle of helping the NFL figure out the implications of CTE, he sent a copy of his book *The Longevity Factor*, along with a supply of dietary supplements, to Peter Davies, the neuropathologist brought in by the league to evaluate Omalu. “Now just don’t forget to take your fish oil!!” Maroon wrote in an e-mail. Maroon ingested the products he endorsed. He prescribed them for his patients and wrote about them in his books. Besides, he reasoned, what was the alternative? “Tell me what medicine is going to prevent concussion or treat concussion, what medicine is out there?” he said.

“I’m 72 years old; I’m 72 years old,” said Maroon, looking trim and dapper one afternoon in his office at Pittsburgh’s UPMC Presbyterian Hospital. “I’m doing what I believe. And I really mean it that way. I believe this. This is what I would do for me. This is what I’d do for my kid and what I do for my patients. So it can be said to be crackpot. But tell me what you’re doing better?”

In November 2012, the FTC ordered the makers of Brain-Pad, the mouth guard, to stop making claims that their product reduced concussions. The agency also sent warning letters to 18 other marketers of “anti-concussion” products. Six months later, the FTC closed its investigation into Riddell and other helmet companies. In a letter to Riddell, Mary K. Engle, the FTC’s associate director for advertising practices, wrote that the agency had concluded the UPMC study “did not prove that Revolution varsity football helmets reduce concussions or the risk of concussions by 31%.” The UPMC study also didn’t prove, as Riddell had claimed, that the Revolution Youth helmet had that effect, because the study never looked at those helmets.

But the FTC had decided not to sanction Riddell. That was partly

because the company, after years of making the UPMC study the centerpiece of its national marketing campaign, had “discontinued use of the 31% claim,” Engle wrote.

The NFL had long prided itself on its PR machine. Now the machine was facing its greatest challenge. Since its inception, the NFL had played on the country’s primal urges, promoting itself as a refuge for legally sanctioned violence. That would obviously have to change. With former NFL stars shooting themselves in the chest to spare their brains and thousands of players suing the league, the task of remaking football’s image would not be an easy one.

In 1970, when the NFL and the AFL officially merged, the league produced a coffee table book that offered an unusually frank assessment of life in the NFL. Half-naked players were seen lounging in a trainer’s room next to miles of athletic tape and drawers filled with painkillers; armored gladiators walked single file toward an unseen battlefield; piles of humanity fought in the muck, a boiling mass of indistinguishable arms and legs.

The NFL let the players tell the story in their own words, interspersing their quotes with meditations on war and aggression from philosophers and psychiatrists:

“Football is a violent game. You are physically attacking another person. To do this, you almost have to change your personality, to break down some of the things taught you, because this is not accepted in our society.”

—Howard Mudd, guard, San Francisco 49ers

“Violence, in its many forms, [is] an involuntary quest for identity. When our identity is in danger, we feel certain that we have a mandate for war.”

—Marshall McLuhan, *War and Peace in the Global Village*

“It’s a feeling of exhilaration. Boy, you really knocked the hell out of that guy. You just feel great because you hit somebody.”

—Ernie Stautner, tackle, Pittsburgh Steelers

“There is, in the modern community, no legitimate outlet for aggressive behavior. To keep the peace is the first of civic duties, and the hostile neighboring tribe, once the target at which to discharge phylogenetically programmed aggression, has now withdrawn to an ideal distance, hidden behind a curtain, if possible of iron. . . . The main function of sport today lies in the cathartic discharge of aggressive urge.”

—Konrad Lorenz, *On Aggression*

The NFL took the violence at the core of the sport and turned it into art. The book, *The First Fifty Years*, was produced by “the creative staff of National Football League Properties, Inc.,” the league’s licensing arm. It had the same raw and hagiographic feel as the work produced by NFL Films, another project Commissioner Pete Rozelle had funded. *Sports Illustrated* would famously call NFL Films “perhaps the most effective propaganda organ in the history of corporate America.” The company’s origin story has been told and retold, mirroring in many ways the birth of the modern NFL. The founder, Ed Sabol, was a former overcoat salesman who received a 16-millimeter Bell & Howell movie camera as a wedding present and later used it to film his son’s high school football games. Sabol ultimately left his job and created a production company. He somehow persuaded Rozelle to let him shoot the 1962 NFL Championship Game between Green Bay and New York; the 28-minute production was a wild success, and thus was born NFL Films.

Sabol soon joined forces with his son Steve, an art major and film lover who infused the enterprise with a style that combined pieces of his favorite artists and movies: the tight close-ups of clawing hands and rock in the 1946 film *Duel in the Sun*; the use of light and shadow by the Renaissance masters; Leni Riefenstahl’s epic presentation of the 1936 Olympics; the sweeping musical scores of movies like *Gone with the Wind*. The highlight reels produced by NFL Films were tales of heroism and sacrifice. Amid the martial music that stuck in every fan’s head came the “Voice of God,” John Facenda, who made a recap of a midseason game between the Chiefs and Vikings seem like the Battle of the Bulge. NFL Films would win more than 100 Emmys. *They Call It Pro Football*, the Sabols’ magnum opus, released in 1967, was recognized

by the National Film Registry of the Library of Congress, which called it the "Citizen Kane of sports movies." The film opens with Facenda intoning: "It starts with a whistle and ends with a gun."

Violence, stylized and exquisitely rendered, was always an inextricable part of the show, no less than was the case in the Martin Scorsese and Francis Ford Coppola films of that era. NFL Films pumped out titles such as *Crunch Course*, *Strike Force*, *Moment of Impact*, and *The Best of Thunder and Destruction: NFL's Hardest Hits*. "In the NFL's war zones, the most explosive weapon that can be deployed is a man's body," Facenda declares in *Crunch Course*.

There was always one major difference between the NFL's brand of art and everything else: "Unlike other forms of popular entertainment, NFL football is *real*—the players actually do what they appear to be doing—yet at the same time it is a creation of the media, and it generates some of the most powerful fantasies in our culture," wrote Michael Oriard, a former Notre Dame and Kansas City Chiefs offensive lineman who went on to become Distinguished Professor of American Literature at Oregon State University. "The actuality of football is the source of its cultural power, but media-made images of that reality are all that most fans know."

The images are seductive yet deceptive. Like war movies, the images soften and glorify the violence to the people who watch. The reality, like war itself, is far different. Those who get close to the NFL battlefield are left in awe of its ferocity and speed, the sheer sound of it, as memorable as giant waves crashing repeatedly on the shore. Andy Russell, the Steelers great, broke into the league as a third-team linebacker in 1963. In his first game, the starter, John Reger, collapsed after a brutal hit and swallowed his tongue. Reger went into convulsions on the field, like a man having a seizure. The team doctor searched frantically for a tool to pry open Reger's jaw. Unable to find one, he chipped out his front teeth with a pair of scissors. Blood sprayed everywhere—onto the grass, the doctor, Reger's white jersey. He left the stadium in an ambulance. A few plays later, the second-string linebacker sustained an ankle injury that also put him out of the game. Thus began Russell's 12-year career.

Now, for the first time in its history, the NFL needed a new image,

one that instead of glorifying the violence deflected attention from the fact that it was driving men mad. The stakes were obvious. The NFL's success depended not only on the buy-in of millions of fans for whom injuries were an acceptable and even attractive part of the entertainment but also on the parents who submitted their kids to the Darwinian system that led to the glory, however distant, of the NFL. Maroon, in his burst of candor after examining Omalu's slides, had summed it up perfectly: "If only 10 percent of mothers in America begin to conceive of football as a dangerous game, that is the end of football." Or as the *Times* blog had asked, "Is Tackle Football Too Dangerous for Kids to Play?"

And so it came to pass that the NFL found itself reaching out to a new constituency: mommy bloggers.

In the summer of 2012, Lorraine Esposito, a New York life and fitness coach, mother of two teenagers, and author of a blog that was published on WorkingMother.com, received an e-mail from Clare Graff of the NFL's Corporate Communications Department:

"As the mother of a little boy and someone who combs the headlines every day, I see all the stories about concussions in youth sports, as I'm sure you do as well," Graff wrote. "Through working at the NFL, I've been lucky enough to interact with some of the country's most respected neurologists, and I've learned a lot about concussions—what causes them, how to spot the symptoms, and how to treat and prevent them."

"We're inviting parenting/health writers and bloggers to the NFL offices in August, around the time kids head back to school and back to sports. We want to hear what concerns you and your readers about youth sports and injuries, what keeps you up at night, and share some resources with you that may be helpful on the topic."

Esposito was thrilled to be invited to the "Youth Health & Safety Luncheon" at the NFL's offices in New York. She was joined by about 50 people like her, mostly influential women who might be concerned about the continuing bad news about football and brain damage. The group was given a tour of NFL headquarters and introduced to the team that oversaw officials. The luncheon featured the commissioner; Scott Halenbeck, the executive director of USA Football; Holly Robinson Peete, the wife of former NFL player Rodney Peete "and a football mom"; Elizabeth Pieroth, a neuropsychologist and head injury consultant to

the Chicago Bears; and Kelly Sarmiento, a health communications specialist for the Centers for Disease Control and Prevention.

Goodell spoke to the group about the need to change the culture of football. It wasn't totally clear to Esposito what that meant, but she found Goodell solicitous, a good listener.

"To his credit, he really wanted to know," Esposito said. "I asked him to help me define what this cultural change really is. We started talking about the training and equipment. I said, 'That's not what I mean. What's the culture you're talking about?' He said: 'That is a great question, but I don't have an answer for you.'"

Still, Esposito came away convinced that the NFL was committed to creating a healthier and safer sport.

Similar events followed. Amanda Rodriguez, who blogs under the name Dumb Mom, said she learned about some "myths that people should know about. . . . I think that my perception of concussions has changed dramatically. One, I feel like football gets a pretty bad rap as the most dangerous sport. I didn't realize that kids were being concussed in other sports, especially soccer. We learned about that at the NFL. And most concussions don't happen in a sport. Kids get concussed riding their bikes."

After one session, a mommy blogger tweeted: "Football and sports are SO good for kids. Don't let the worry keep your kids from playing sports."

Another, quoting Pieroth, the neuropsychologist who works with the Bears, tweeted: "'We need to balance the hysteria of #concussions with the benefits of sports participation,' says Dr. Pieroth [#nflhealthsafety](#)."

For years, the PR machine had disseminated the message that concussions were a nonissue. Now the NFL was pouring its resources into the message that health and safety were *the* issue. All the symbolism of the previous era began to fall away. The image of two helmets crashing together and exploding that preceded *Monday Night Football* for over two decades was quietly discontinued by ESPN at the request of the NFL. ESPN already had ended its popular Monday Night Countdown segment "Jacked Up!" after the first cases of CTE surfaced in 2006. CBS no longer ran "the Pounder Index," another pregame segment, sponsored by McDonald's, in which the biggest hits of the previous

week were assessed on a 10-point scale. In January 2011, the league pressured Toyota to pull a commercial that featured a helmet-to-helmet collision between two youth players. Under the direction of Paul Hicks, a veteran of the powerhouse Ogilvy Public Relations, the league crafted a new message that stressed the "evolution" of the sport. The primary vehicle was an interactive website, [NFLevolution.com](#), that highlighted changes in rules and equipment through the decades and a TV commercial directed by Peter Berg, creator of the series *Friday Night Lights*. The commercial showed a kick return that starts in Canton, Ohio, in 1906 with a runner trailing a flying wedge—a blocking technique later banned because of its destructiveness. The return progresses upfield through time, the rules and equipment changing, and ends with Devin Hester, the Bears return man, scoring a touchdown after breaking a recently prohibited horse-collar tackle. Ravens linebacker Ray Lewis delivers the voice-over: "Here's to making the next century safer and more exciting. Forever forward. Forever football."

This was the new era of the NFL. The game had come a long way. It wasn't that long ago that a defensive lineman could sheath his forearm in plaster and bash an offensive lineman in the head. Leg whipping was once legal, as was clotheslining and the crack-back block, which ripped apart the knee ligaments of an untold number of linebackers. But the game continued to evolve.

The commercial, which premiered during the 2012 Super Bowl, featured a number of recognizable greats: Hall of Famer Ollie Matson, who played 14 seasons in the 1950s and 1960s; Rick Upchurch, an electrifying Broncos kick returner in the 1970s and 1980s; and Mel Gray, the great Cardinals wide receiver in the 1970s and early 1980s.

As the commercial continued to run, Matt Crossman, a writer for *The Sporting News*, pointed out that Rick Upchurch and Mel Gray were among the thousands of players suing the NFL, along with Ollie Matson's family. Matson had died in 2011 after years of struggling with dementia. In the end he couldn't speak. His family donated his brain to BU, where Ann McKee diagnosed him with one of the most severe cases of CTE on record.

BUZZARDS

On the afternoon of May 2, 2012, Omalu was hunched over a microscope when his phone started blowing up. He ignored it, but when the calls kept coming, he looked down at the number and answered. It was Bailes calling from Chicago, his voice urgent.

"What is this? Is everything okay?" Omalu said.

"Haven't you heard?" said Bailes. "Junior Seau just killed himself."

"Who's Junior Seau?" Omalu replied, predictably.

Bailes told Omalu to get on the Internet. Omalu started reading and absorbed the gist of what had happened that morning in Oceanside, California. Seau, 43, one of the finest linebackers in NFL history, had been found dead of a self-inflicted gunshot wound at his beachfront home.

The implications were obvious. Throughout the country, Seau's suicide provoked shock and profound sadness in a generation of football fans for whom he embodied the cathartic ecstasy of the sport. Seau was an icon in San Diego, a man whose love of life had seemed as real and unflagging as the sun. But to CTE researchers, Seau's death carried a different meaning. He had played in the NFL for 20 years, one of just two defensive players—the other was Redskins cornerback Darrell Green—to make it through two full decades. He had made 1,524 tackles, fourth on the unofficial all-time list. He was a certain Hall of Famer. Like Duerson, Seau had shot himself in the chest; his brain

Buzzards

was pristine and intact. As concern about the health effects of football spread, attracting more and more prominent scientists, Seau in death was instantly transformed into a rare and valuable research commodity, his brain the most coveted specimen to come along since the connection between football and brain damage became known.

Omalu, shunned by the NFL and overshadowed by the BU Group, immediately grasped the significance, personal and scientific, even if moments earlier he hadn't known who Junior Seau was.

"What do you need me to do?" he said.

"We need to secure this brain," said Bailes.

Others, of course, had the same idea, including the NFL.

Even the people closest to Seau said they were shocked. His suicide was like peeking behind the facade of the most beautiful building in the world and finding a desert. For decades, there was a fairy-tale quality to Seau's life, except that it was demonstrably real. Raised in a violent ghetto of Oceanside, 40 miles up the coast from San Diego, the son of immigrants from American Samoa who steeped their children in their transplanted culture, Seau had become one of the most talented and beloved players in NFL history.

The NFL had never seen anything like him. He was like a new species, a 6-foot-3, 260-pound floating linebacker who ran the 40-yard dash in 4.61 seconds, bench-pressed 500 pounds, and had a 38-inch vertical leap. In college, Seau had played outside linebacker, with his hand in the dirt, but the Chargers moved him inside, and the effect was devastating. He was mentored by Gary Plummer—Plummer played right inside linebacker, Seau left—who had just turned 30 and was blown away by what his new teammate could do.

Seau sometimes would line up 12 yards deep, "and he'd just fucking blitz!" said Plummer. "He wasn't supposed to and, you know, *bam*. He really changed the game. He was a freelancer, and he had such amazing physical tools he could get away with it. A guy like me, no way, they're going to cut me tomorrow."

San Diego fell in love with Seau during his 13 seasons with the Chargers. Part of it was his improvisational talent and his hometown roots, but in large measure his appeal stemmed from an ability to make peo-

ple feel better about themselves. Seau was loud, playful, and flirtatious, a giant kid who greeted friends and strangers by yelling, “*Buddeeee!*” Close friends and family called him June or Junebug. A lifelong surfer, he carried himself with a relaxed confidence, as if he had absorbed the soul of the sea. Seau seemed to know exactly where he came from and what he wanted to give back to the world. He started a charity, the Junior Seau Foundation, to help underprivileged kids in San Diego. During a luncheon for the foundation in the late 1990s, he met a motherly and sweet-natured consultant for the United Way named Bette Hoffman and asked her to help out. Hoffman already had more work than she could handle but couldn’t resist. “Junior’s personality was bigger than life,” she said. “He was so charismatic and so fun and so intriguing. I was used to working with nonprofits; I’d never worked with a football player. But you know, I realized that he had such a compassion for wanting to help the people in San Diego. When he walked into a room, he didn’t have to say a word; you knew he was there. He had this amazing capacity when he was talking to someone; people truly believed that he or she was the most important person in the world.”

Seau was soon calling Hoffman “Mom” and relying on her to help run his affairs. Together, they built one of the most successful athletic foundations in the country. They also opened a restaurant, Seau’s, in Mission Valley that thrived on his good name. From his humble beginnings, Seau had become an engaged and focused community leader. “I would show him budgets for every event and for overall projections, and he was just so sharp with those,” said Hoffman. “He would know exactly what we needed to do, how we needed to get there and implement it.” Seau served as auctioneer at the Seau Foundation’s annual fund-raisers. Before the event, he would memorize the floor plan to know where all the heavy hitters would be sitting and then use his smile and charisma to cajole them into making bids. “He was like a son to me; I really considered him one of my sons,” said Hoffman. “He was just so dear, and he was just so sweet.”

Seau had had a son with his childhood sweetheart and two boys and a girl with his wife, Gina, a former Chargers marketing associate whom he met as a rookie. Before they divorced in 2001, Gina watched the cult of Junior grow in San Diego—from the afternoon when he was a rookie

and a woman asked for his autograph while they were out buying milk and cookies to “four or five years down the road and we couldn’t go sit and have dinner without ten, fifteen, twenty interruptions.”

During the final years of Seau’s career, there were signs that he was changing. Without warning, one day he exploded at his oldest son, Tyler, to the point where the two had to be separated by Junior’s friends. “It never got completely physical, but it was close,” Tyler said. “I’ve never really seen him that angry before.” Seau played his last down with New England in 2009. By the time he returned to Oceanside, where he had bought a \$3.2 million home in 2005, the people closest to him could tell he wasn’t right. He seemed totally unprepared for the transition out of football, which was difficult for all players but especially for one who had played almost continuously since his teens. Seau was 40. He had earned over \$50 million. But his world quickly began to collapse, financially and spiritually.

Seau was drinking heavily, according to his friends and family. Hoffman was unable to get him to focus on his restaurants or the foundation, a change she had noticed as far back as 2003, after Seau left the Chargers to play in Miami. Now, when Seau made presentations to potential donors, he rambled and lost his train of thought. He had volcanic eruptions of anger, particularly when he drank. His memory seemed to be fading. One day, his son Jake, a star lacrosse player, had a big game in Torrey Pines. Seau’s daughter, Sydney, called repeatedly to remind him to be there, including on the morning of the game. “I text him 20 minutes beforehand and I’m like, ‘Where are you? They’re warming up,’ ” she recalled. “And he’s like, ‘What are you talking about? I thought that’s tomorrow.’ And I’m like, ‘No, I called you this morning. We talked about this. You need to be here. Get here now.’ ”

As Seau’s problems grew worse, he withdrew from his family and close friends, going months without seeing his kids. Hoffman became alarmed by his growing gambling addiction, which cost him hundreds of thousands, if not millions, of dollars. “It just became more and more serious,” said Hoffman, who had control of Seau’s finances. Seau would call her from Las Vegas, sometimes frantic, asking her to wire huge amounts of money to keep him going.

On October 17, 2010, Seau was arrested on charges that he had assaulted his live-in girlfriend, Mary Nolan. She told officers that Seau had "grabbed her by the arm and shoved her into the wall/dresser in their bedroom." Seau was released on \$25,000 bail, Nolan never filed a complaint, and the case was dropped. But Seau was inconsolable. The morning after the incident, a few hours after he left jail, Seau was driving up the coast when he ran his Cadillac Escalade off a cliff. The SUV careened down a 100-foot slope and settled in the sand near the water. When Gina learned about the accident, she grabbed the kids and drove to Scripps Memorial Hospital in La Jolla, where Seau had been taken in an ambulance with, remarkably, minor injuries.

Seau was still in the emergency room when his family arrived. "He just looked so broken, and I mean not just physically," said Gina, who stayed close with her ex-husband. "His eyes: He just looked so sad and so defeated, this big guy that barely fits on the bed."

Seau insisted that he had fallen asleep at the wheel, that the accident wasn't a suicide attempt. At the time, Gina believed him. Still, she told him it was an opportunity to turn his life around.

"You've got another chance in life," she said. "You're very blessed. You lived to see another day. What are you gonna do? You have so much to live for. Our kids are progressing so beautifully. You'd be so proud of them. Get in the game."

"You're right, G," said Seau. "You're right."

But soon he disappeared again; Gina and the kids found out from *TMZ* that Seau was back in Vegas just a few weeks after the incident. In January 2011, Bette Hoffman quit as the head of the Junior Seau Foundation. "I was just done; I'd had so much, you know, trying to protect him and cover for him," she said. "I thought, 'What am I doing?' I mean, I couldn't help him. He wouldn't listen to me."

"Oh, Mom," Seau said when Hoffman told him she was quitting. He called her repeatedly, begging her to change her mind. Instead, Hoffman changed her phone number.

Seau's daughter, Sydney, decided to stage a one-girl intervention. Sydney was a high school senior, a promising volleyball player with wavy brown curls and her father's charisma and megawatt smile. She was every bit a daddy's girl; she worshiped her father and wanted to

be around him as much as possible: "He was just a light, that's how I'd describe him," she said. That year, Seau had missed most of Sydney's senior season. She had written an English paper about the void her father had left in her life, and it emboldened her to confront him. "I drove over to his house, and I just told him everything," she said. "How I wasn't gonna take a backseat anymore because I was sick of waiting. It hurt me to have to pull so much. It was just hard because I wanted him to want me more than anything. And my whole life was to make him proud and to make him want to see me."

"He just looked in a straight line and cried and didn't hug me, didn't say a word. He just sat on the couch. And that's what really bothered me. How can I express all of this emotion and you just cry and not even want to console me? Like, that's not normal. He just told me that he had never really, truly felt love. And I was like, 'What does that mean?' But it didn't change. He was still really distant."

Sydney decided to attend USC, her father's alma mater, "because that's his second home and I could share that with him." In March 2012, she, Seau, and Gina drove up to Los Angeles for spring orientation. It was the kind of moment Sydney had yearned for. Her parents had been divorced for 10 years, but they all went to dinner together at the Palm before attending a Lakers game. "He was being such a tease and a flirt, and the waitress came by," said Gina. "She goes, 'Oh, you guys are such a cute family.' I was about to say, 'We're not married.' And he said, 'Meet my future wife. This is Gina.'"

"Dad!" exclaimed Sydney, laughing.

Five weeks later, Seau shot himself in the chest with a .357 Magnum revolver.

Unlike Duerson, Seau hadn't left instructions for what to do with his brain, and so it was never known if he shot himself in the chest to preserve it. His girlfriend, Megan Noderer, found him on a queen-sized bed in an upstairs guest room after returning from the gym that morning. After calling 911, Noderer pulled Seau to the floor in an unsuccessful attempt to administer CPR. When police arrived, the bed was strewn with bloodstained pillows and sheets, a gray stocking cap, and the gun, which lay on its left side with five bullets in the chamber and

one spent round near the headboard. Seau's cell phone also was on the bed, the SIM card removed, a fact that was never explained.

Seau was placed on a gurney in a body bag and brought down to the garage. Outside, some 400 people had gathered: neighbors, Chargers fans, news crews, Seau's extended Samoan family. Inside the sweltering house, Seau's closest relatives and friends milled around in shock amid his trophies, signed helmets, and game photos. In the late morning, the family decided to open the garage for a spontaneous public viewing. Seau lay on his back, the body bag zipped up to his neck, his head exposed. Hoffman bent over and kissed him. "Good-bye, Junior, I love you," she said. "He just looked like he was asleep on the couch," said Hoffman, sobbing at the memory. "He didn't even look like he was dead. I had to wake him up so many times from a nap, and that's how I said good-bye to him." For nearly an hour, the tearful crowd filed past.

That afternoon, Tyler, Seau's 23-year-old son, was still at the house when his phone rang.

It was Omalu and Bailes, asking for his dad's brain.

If the two doctors were concerned about the unfortunate timing—just a few hours after Seau was carted out of the garage—the feeling was superseded by the urgency they felt. Within a day, Seau's body would be autopsied; without preparation, his brain might be buried with him or destroyed. More immediately, there was also the competition: Omalu and Bailes knew that Nowinski and the BU Group would soon make a big push, if they hadn't already, presumably backed by the NFL. They felt they had to move now.

Bailes, Omalu, and Tyler Seau would remember the call differently. Omalu said: "We introduced ourselves, explained what we were doing, about CTE, that we would like him to grant us consent to examine his father's brain." He described Tyler as "very polite" and receptive during the brief call.

But Tyler said he immediately felt pressured by Omalu. "He was very pushy, and he really wanted me to make a decision that night. He pretty much said that we have to do it now because if it's not done the right way, we could lose a lot of the tissue and things like that." Tyler already was under unthinkable pressure; with his father's death, he had become responsible for a host of family decisions. Quiet and thoughtful,

four inches shorter and 40 pounds lighter than his dad, Tyler had played linebacker at Palomar Community College in San Diego and Delta State University, a Division II school in Cleveland, Mississippi. Now he was working in Seau's restaurant.

During the call with Omalu and Bailes, Tyler agreed to donate his father's brain to their group.

Omalu initiated the paperwork that would allow him to harvest Seau's brain. He faxed a consent form to Tyler, who initially indicated that he was prepared to sign. At 8:38 that night, Tyler wrote in an e-mail to Omalu: "my guy is on his way here right now so I can sign it and fax it back to you." An hour later he wrote again, asking Omalu to contact David Chao, the San Diego Chargers' doctor, to "cross our Ts and dot our Is before proceeding."

Junior Seau and Chao were close. Tyler said Chao had continued as his dad's personal physician after Seau left the Chargers. Tyler was growing wary about his decision, and he felt Chao was the logical person to help him sort out what to do. But Chao had his own issues. The day after Seau shot himself, the orthopedic surgeon appeared before the Medical Board of California to respond to allegations that he committed acts of "dishonesty or corruption" by failing to report a 2006 drunk driving conviction on an application to evaluate workers' compensation cases. Later that year, the board moved to revoke Chao's medical license over three separate malpractice claims. (DeMaurice Smith, executive director of the NFL Players Association, would take the unusual step of calling for Chao to be replaced as the Chargers' doctor. A panel of independent physicians created under the league's collective bargaining agreement ultimately exonerated Chao. Soon after, Chao resigned his position with the Chargers, citing health and family reasons.)

Now, at Tyler's request, Chao became the point person for what would happen to Seau's brain. The night of Seau's death, Chao called Omalu and berated him, according to Omalu. "That was one of the most arrogant phone calls I've ever been involved with in my life," said Omalu. "This guy was yelling, was extremely arrogant, pretty much questioning who I was." After the contentious call, Omalu e-mailed his credentials and samples of his research to Chao. He was convinced he

still had "verbal consent" from Tyler to take Seau's brain. He booked a flight from San Francisco to San Diego to do just that.

By then, at least a half dozen prominent researchers were making a play for Seau's brain. The deputy medical examiner, Craig Nelson, returned from Seau's home to find a sheaf of messages stacked up at the office. "It felt sometimes to me like buzzards were circling," Nelson said. "I have a scientific mind and a medical background, but when someone has just died, things are very fresh. Imagine that your parent dies and then hours later somebody is calling you and saying, 'Hey, would you consider donating this for research?' It can sit a little odd, and when it's such an unexpected death, it makes it harder."

Nelson's buzzards included a Nobel laureate brain researcher, Stanley Prusiner, director of the Institute for Neurodegenerative Diseases at the University of California, San Francisco. Prusiner, a 70-year-old scientist with a cloud of white hair, won the 1997 Nobel Prize in Physiology or Medicine for his discovery of prions, a class of infectious proteins behind brain disorders such as mad cow disease and Creutzfeldt-Jakob disease. Prusiner's specific interest in CTE wasn't clear, but he launched a tag-team effort with Omalu to bid for Seau's brain. Within hours of Seau's death, Prusiner placed calls to the medical examiner's office to try to arrange a meeting with Seau's family. He had his assistant call and e-mail Tyler Seau.

Omalu and Prusiner egged each other on. "Please it is vital you get to the Seau family," Omalu wrote Prusiner in an e-mail the day after Seau's suicide. "I think they will give you/us the brain if you directly speak to them and play the nobel price [sic] card :)"

Prusiner responded by e-mail 12 minutes later that he was planning to fly to San Diego to meet with the Seau family.

But BU was launching its own offensive. At 5:55 A.M. (2:55 California time), the morning after Seau killed himself, popular *Sports Illustrated* football writer Peter King issued a supportive tweet for the BU Group to his more than 1 million followers: "Dedicated researchers in Boston studying deceased players' brains for evidence of trauma attempting to obtain Junior Seau's. Hope they do." King thought the tweet was harmless, but it quickly morphed into a national news story that was picked up by NFL.com, ESPN.com, and other websites. Seau's

family was outraged by what they perceived as more tactless pressure. Nowinski and others scrambled to contain the damage. They urged King to "retract" the tweet and apologize to Seau's family. Nowinski later claimed that King had based the tweet on his own assumption that BU would chase after Seau's brain. But King said, in fact, he had confirmed BU's interest. King refused to apologize or make a retraction. "I empathize with them and know how badly they wanted to see Seau's brain," he said. "I was sorry it put them in an awkward situation, because I believe in what they do."

He issued a vague follow-up at 11:13 A.M.: "To clarify researchers seeking Seau's brain: Info not from them. They seek to examine all ex-players who played contact sports. Every one."

When Gina heard about the requests that were pouring in for her ex-husband's brain, she was horrified. "It was the most foreign thing I'd ever heard of, quite honestly," she said. "And the fact that I had to have a conversation with the coroner and ask, 'If we decide to donate it, how do you take it out? And what do you do with it?' And here we are about to have a funeral service. This is an open casket. It was crazy. It was really bizarre."

Not long after the Twitter contretemps, Omalu touched down in San Diego. He was carrying a special "brain briefcase." Nelson, the deputy medical examiner, believed Omalu had permission from Seau's family to take the brain and thus had invited him to participate in the autopsy. Omalu's plan was to remove Seau's brain and fly it back to San Francisco, where he would divvy it up with Prusiner. Omalu headed straight from the airport to the medical examiner's office, a hulking three-story building on the north side of town. Nelson told Omalu he couldn't take any tissue without written consent from Seau's family. That hadn't materialized, and so Nelson asked Joe Davis, the office chaplain, to call Tyler Seau and have him fax it over. Omalu spent much of the morning chatting with Davis, recounting his battles with the NFL and talking about his faith. Omalu then joined Nelson in the autopsy suite, a cool, windowless room with fluorescent lighting and a dozen workstations equipped with gleaming stainless steel tables, oscillating saws, and plastic cutting boards. The office lent Omalu scrubs and a clear plastic visor.

Soot and the imprint of the gun's muzzle were still visible on Seau's

chest. He had no alcohol or drugs in his system except for zolpidem, the insomnia medication whose trade name is Ambien, and naproxen, an anti-inflammatory. Nelson made a Y-shaped incision and removed most of Seau's vital organs. Omalu removed the brain and the spinal cord. He sliced Seau's brain with a long knife and placed half in a small tub filled with formalin. The rest he froze under protocols prescribed by Prusiner.

As the autopsy was wrapping up, Davis, the chaplain, received a call back from Tyler. He wasn't calling to sign over his dad's brain. He was in a rage, screaming about Omalu.

"I talked to the NFL," Tyler told Davis. The league, he said, had informed him that Omalu's "research was bad and his ethics are bad."

"He is not to be in the same fucking room as my dad!" he told the chaplain. "He's not to fucking touch my dad! He's not to have anything to do with my dad!"

Davis tried to calm him down.

"Nothing's going to happen without your permission; just rest your heart in that," he said. "But let me ask you, why the U-turn? I mean, you talked to him last night, and the only reason he's here is because you told him to go ahead and buy a plane ticket and come here. So just help me understand why the U-turn."

Tyler repeated that he had talked to "the NFL," without specifying whom, and repeated that he was told Omalu was unethical and his research was flawed. At one point, Tyler mentioned having received advice from Chao. Davis reassured Tyler that nothing would happen without his permission. "But you got to understand," Davis added, "the NFL may very well not want him to do the research because he's the guy that's proving the post-concussion syndrome. You need to think about that." Tyler merely reiterated that he wanted Omalu out.

Davis hung up and went to the autopsy room. He entered with a troubled look on his face.

"Houston, we have a problem," he announced.

It was too late, of course, to keep Omalu away from Seau's brain; he already had dissected it. Nelson felt he was on solid legal ground: He had every right as deputy medical examiner to bring consultants into the autopsy room. But he wanted to protect Seau's family, not insult them. At that moment, Omalu said, he was "persona non grata." He

felt like it was a replay of the persecution of his science and his reputation over the previous six years. "It reminded me of the way Casson, Pellman, and Viano dismissed me, actually calling me a fraud as well," he said. "It's the same pattern. To summarize it: a systematic effort to marginalize me, delegitimize me, and dismiss me. To pretty much make me null and void, an outsider not to be trusted."

"Why do I deserve to be treated the way I'm being treated?" Omalu asked, growing emotional. "For doing good work? Isn't that what America is about: doing good work, enhancing the lives of others?"

Omalu returned to San Francisco, depressed, his brain briefcase empty. "My poor wife, who's seen me go through this over and over and over, she cried, you know?" he said. "After that I just said, 'You know what? This is it for me. I think I've done my part.' The Junior Seau case made me regret ever getting involved in CTE."

Prusiner, oblivious to the debacle that had taken place 400 miles to the south, sent Omalu a celebratory e-mail, attaching an article from ESPN.com, which had learned that Omalu had participated in Seau's autopsy. "Your trip to San Diego was really important," the Nobel laureate wrote. "Please see the wonderful attached write-up about you, the CTE identifier. I shall call Tyler and David Chao tomorrow and create a time to meet them in SD."

The chances of that happening were exactly nil. The world again had changed. Omalu and Bailes, Nowinski and Cantu—all of the dissenters—had succeeded in toppling the NFL's established order. It was an astonishing achievement. Casson and Viano and the MTBI committee were gone. Pellman seemed to be in internal exile, still with the league but unseen. But there was a new order. Those men had been replaced by other men with their own views about what was best for the NFL. Omalu was never part of that world, but now BU, too, was about to be elbowed aside by the league regardless of the framed commitment hung up on the wall back in Boston.

As he appealed to the Seau family through Chao, Nowinski emphasized BU's status as the official brain bank of the NFL. But at the same time Nowinski was trying to close the sale, the NFL was working to direct Seau's brain *away* from BU. At the center of the league's effort were the members of the new concussion committee. Behind the scenes,

they had their own strategy to secure Seau's brain. They hadn't succeeded with Duerson's brain a year earlier, but this time they were prepared. To execute their plan, they summoned the same power, resources, and reach that until recently had been used to deny the very existence of brain damage in football players.

The point man was Kevin Guskiewicz, once one of the original Dissenters but now a powerful member of the reconstituted committee. Guskiewicz was one of the critics the NFL had recruited after disbanding the old MTBI committee. Now he found himself working against his former allies, including Bailes, his cofounder of the Center for the Study of Retired Athletes. Guskiewicz and Chao had a mutual friend, a former trainer at UNC, and Guskiewicz advised Chao to send Seau's brain not to Omalu and Bailes or the BU Group but to the NIH, where the head of research for the NFL's new concussion committee, Russ Lonser, worked as chief of surgical neurology. That is, Lonser worked for both the NIH *and* the NFL.

Guskiewicz had never forgotten his revulsion when Omalu put up photos of Webster's corpse three years earlier at the Palm Beach meeting of the Players Association. Guskiewicz said he told Chao that "within the circles that I hang out within the scientific community," Omalu was known for "sensationalizing at times" and for "showing slides of the deceased person—their brain—and that sort of thing." Chao relayed the message to Seau's family: Omalu was bad news. But Guskiewicz wasn't done. He told Chao about his concerns that BU had its own agenda, that McKee was fanning the hysteria about football and brain damage by overstating the prevalence of CTE.

Guskiewicz, like his colleagues on the NFL's new committee, thought donating the brain to the NIH was a tidy solution to a messy situation. The brain race had gotten out of hand. Guskiewicz had an uncle in Latrobe who died of pneumonia in his early forties; the ordeal was traumatic enough without the presence of strangers clamoring for his organs. "All this knocking on doors, the calls, I just can't imagine going through it," Guskiewicz said. "It puts a black mark on the entire neuroscience community because some of us, I think, are perhaps guilty by association. So I think that's concerning."

Two months after Seau's death, after the intervention of three mem-

bers of the NFL's concussion committee and the team doctor for the San Diego Chargers, his brain was shipped to the NIH.

Two months after that, the NFL donated \$30 million to the NIH for concussion research, the largest philanthropic gift in the league's history.

The NFL said there were no strings attached to the donation, a pledge identical to the one the league had made to BU three years earlier.

On one level, it made perfect sense. The chase for Junior Seau's brain had turned into a macabre spectacle, adding to his family's anguish. The NIH could apportion his brain tissue to any independent scientist, not just those whose reputations would be enhanced by the diagnosis. As Gina Seau said, "I didn't care about what people and doctors were competing for. I just cared about a high level of scientific study, doing it properly without bias. I cared about us getting to the bottom of what was really happening without anything to prove. We just wanted the truth."

But of course there was another side to it. In Wheeling, West Virginia, Bob Fitzsimmons watched the battle over Seau's brain with knowing bemusement. The former coach of Team Webster, the man who beat the NFL in court for \$1.8 million, Fitzsimmons had followed the league's tortured struggle to get a handle on the concussion crisis for two decades. He wondered how much had really changed. Mike Webster had gone mad and died. Junior Seau had gone mad and died. How many more players were out there? The league had embraced BU's researchers and given them money. When the NFL didn't like the message, it cast BU aside and picked another partner and shelled out more money. Despite numerous offers, Fitzsimmons had decided not to take cases against the NFL in order to focus on the science. But he couldn't help but see a pattern.

"I guess the National Institutes of Health is now involved. I guess they somehow got drafted by the NFL," said Fitzsimmons, still in the firehouse-office where Mike Webster once slept in the basement. "They had an early draft, I think, and they drafted the NIH and paid them a pretty good salary, too, from what I hear."

On the day Seau shot himself, Gary Plummer got a call from a former teammate.

"Please, bro, tell me that there's more to it than just the concussions, tell me that, please," said Steve Young.

The Hall of Fame quarterback was in a panic. For years, Young had been telling himself that he wasn't Mike Webster, that he wasn't even Merril Hoge or Al Toon. He was the Vanilla Guy. He'd had his concussions, but that wasn't what had driven him out of the game. And now people assumed that Junior Seau had shot himself because of concussions. Young wanted to know it wasn't true, had to know it wasn't true.

Plummer knew both men well. Young had none of Seau's problems; the money, the gambling, the drinking, the estrangement from his kids. To be around Steve Young for any length of time was to see how incredibly normal his life was, his conversations interrupted by calls and texts from his wife, wondering why he hadn't completed an errand, or messages from friends making sure he knew it was his day to carpool the kids.

"Steve, you don't have relationship issues like this, you don't have debts and people calling in markers, you're not an alcoholic," Plummer told Young. "I really don't think that in a million years that's going to be an issue for you."

Plummer told Young he thought concussions had been "somewhere in the neighborhood of 10 or 20 percent" of Seau's problems.

Young sounded relieved. "You're right, I know you're right," he said. "Bro, I can't thank you enough."

But of course Seau had had CTE. That was certain. The NIH had distributed unidentified tissue from three different brains to three independent neuropathologists. One of those brains belonged to Seau, another to a person who had had Alzheimer's disease, and the third to a person with no history of traumatic brain injury or neurodegenerative disease. All three neuropathologists concluded that tissue taken from Seau's brain showed definitive signs of CTE. So did two NIH researchers, for a total of five confirmations. The telltale neurofibrillary tangles of tau protein that Omalu first spotted in Webster were found "within multiple regions of Mr. Seau's brain," the NIH reported. Officials refused to speculate on the cause of Seau's brain damage. But his family was told by Lonser he had gotten the disease from "a lot of head-to-head collisions over the course of 20 years of playing in the NFL," said Gina. "And that it gradually, you know, developed the deterioration of his brain and his ability to think logically." Lonser, though, did not express that in any of his public comments.

The discovery that Seau had had brain damage provided no solace to his children; in some ways it made them feel worse. "It didn't take any of the pain away; I feel it almost brought more," said Tyler Seau. "Mainly, because I feel bad that I didn't try harder. And just the pain that he was going through for how many years?" In the weeks leading up to the diagnosis, Jake Seau thought that when it finally came, "it'd answer a lot of questions. And, really, it just gave me more. You know, that's just one question answered that we kind of already knew the answer to. But then there's hundreds more."

Jake Seau had played both football and lacrosse his freshman and sophomore years at The Bishop's School in La Jolla. He was 6-feet-2 and nearly 200 pounds. In football, he played running back and strong safety. In lacrosse, he was a midfielder. By his sophomore year, he had received recruiting letters for both sports. Jake had a growing sense that football was his father's game but probably not his. He didn't have the same passion for it as his dad. Seau never put any pressure on Jake, just told him to keep his options open. Each year, as Jake's love for lacrosse grew, he debated whether to play football. Each year, at the last minute, he would give in and suit up.

But no more. Jake had made a verbal commitment to play lacrosse at Duke, a powerhouse in the sport. Football made him think of his father, and so he no longer watched many games. "I still love football," he said. "I grew up with it; I've always been around it. I love the game." But in the most personal and profound way, he was faced with the same uncomfortable questions that the rest of the country was now confronting. With so many alternatives, how can we let our children, our loved ones, ourselves, play a game that may destroy the essence of who we are? How can we enjoy it as entertainment? When his junior year came around, Jake thought about his father and himself. He thought about his family. And this time he didn't suit up.

"To realize this is the sport that he loved and possibly could have killed him, I just can't play it any longer," Jake Seau said.

EPILOGUE

SCARS OF THE GLADIATORS

In 1971, a Boston respiratory specialist named Gary Huber was approached by the tobacco industry with a proposal. The companies wanted to give him money to research the connection between smoking and lung disease. It had been almost 20 years since Ernst Wynder had induced cancer in mice by painting them with tar drawn from cigarettes. Huber, who worked at Boston City Hospital's Harvard Medical Unit, had seen one smoker after another come in with emphysema, bronchitis, and lung cancer, but there was little he could do for them. Big Tobacco said it wanted to help.

"We mistrusted them and initially we said no," Huber told PBS's *Frontline* 24 years later, but the industry was persistent. The executives told Huber he'd have total autonomy. Finally he agreed. "This was an industry who made a product that caused disease, and if we were going to do anything about it, I thought we had to work with that industry," said Huber, whose story is recounted in Dan Zegart's *Civil Warriors* and Robert Proctor's *Golden Holocaust: Origins of the Cigarette Catastrophe and the Case for Abolition*, among other places.

Harvard accepted \$2.8 million from Big Tobacco, at the time the largest health-related grant the industry had given to a university. Over the next eight years, the grant grew to \$7 million. The Harvard Project, started in 1972, produced 27 books and 54 peer-reviewed scientific papers.

The tobacco industry had selected Gary Huber for a reason: He believed the link between cigarettes and disease was unproven. His research had shown that most animals have an “adaptive tolerance” to toxic oxygen and only a few get sick. He had noted that although many people smoked, relatively few seemed to die. Which traits, he wondered, put some people at greater risk?

Big Tobacco’s chief lawyer, David Hardy, wined and dined Huber, flying him to Washington to meet with senators, foreign dignitaries, and cabinet members. Hardy offered soothing reassurances about Huber’s independence even as he subtly tried to edit his work. Over time, Huber became a “sycophant” of the industry he was studying, Zegart wrote in *Civil Warriors*, believing the support from Big Tobacco would continue no matter where his research led.

Then, in 1977, Huber found that rats exposed to cigarette smoke for six months developed emphysema. When he prepared to announce his findings at a conference in Las Vegas, the tobacco industry sent a lawyer to try to “lessen Huber’s inclination to interpret the results as evidence of direct cause and effect.” The effort failed. Shortly afterward, Huber discovered that supposedly safer low-tar cigarettes were potentially more dangerous because their smokers puffed more frequently and held the smoke in their lungs twice as long.

When the Harvard Project’s grant expired in 1980, Huber begged for more money. Big Tobacco cut him off.

“You just got too close to things you weren’t supposed to get into, Gary,” a tobacco executive told him.

But Huber continued to work with the industry. Exiled from Harvard with the elimination of his funding, he moved to the University of Kentucky to work at the Tobacco and Health Research Institute despite warnings that Big Tobacco was setting him up. A tobacco lawyer sat on the institute’s board. Its signature study involved smoking monkeys that were not allowed to inhale fully, making them unusually healthy smoking monkeys. In Lexington, Huber found himself accused of the manipulation of scientific results, administrative incompetence, and even sexual harassment. Within a year, he’d been fired. He moved on to the University of Texas, where he changed his specialty to nutrition.

When attorneys suing Big Tobacco caught up with Huber in 1997,

they showed him internal industry documents to persuade him to testify against his former friends. One memo said programs such as the Harvard Project had been targeted not for their “scientific goals, but rather for . . . public relations, political relations, position for litigation.” Huber was stunned to learn that R.J. Reynolds had done the work he was most proud of—producing emphysema in rabbits—10 years before he had.

He broke down in tears, realizing he had wasted 15 years of his life.

I don’t want people to think that I was bought,” said Kevin Guskiewicz.

He was sitting in an alehouse in Chapel Hill, North Carolina, sipping his favorite porter, making the case that he was still independent after having joined the NFL’s reconstituted concussion committee.

Guskiewicz was an original Dissenter, a respected scientist who had made his name establishing the connection between football and long-term mental illness. He wrote in 2005: “Our findings suggest that the onset of dementia-related syndromes may be initiated by repetitive cerebral concussions in professional football players.” Two years later, in another paper that would define his career, he theorized that repeat concussions associated with football led to “biochemical changes” and “neuronal loss”—that is, brain damage.

But now Guskiewicz seemed to be singing a different tune. It was nearly impossible to distinguish his views from those of the NFL. It wasn’t just Guskiewicz’s attacks on Omalu and McKee or the way he had used the NFL’s power to divert Junior Seau’s brain to the league’s researcher of choice, the NIH.

Guskiewicz no longer seemed to agree even with himself.

“The vast majority of the neuroscience community does not believe that research has established a causal relationship linking repetitive head trauma in football and CTE; I include myself in that,” he said after McKee released a study confirming 28 new cases of brain damage in dead football players. This occurred in December 2012. The BU Group now had 50 confirmed cases of former football players with CTE, 33 of whom had played in the NFL. By then, McKee was convinced that “most NFL players are going to get this. It’s just a matter of degree.”

Guskiewicz said that blaming football for the devastating disease

that had spread through the brains of former players such as Mike Webster, John Mackey, Ollie Matson, Dave Duerson, and Junior Seau, among so many others, was like a track team blaming Nike for a rash of ankle injuries simply because the athletes wore that brand of shoe. The same criticism, of course, could have been leveled at Guskiewicz's own game-changing work. In fact, it was—by the NFL.

Guskiewicz had joined the concussion committee in 2010 because he had become convinced that Goodell represented change and was committed to player safety. He thought he could use the NFL's power and resources for the greater good. The league put him in charge of equipment and rules—he literally could change the rules of pro football!—and Guskiewicz immediately went to work. It had long been known that the kickoff was the most dangerous play in football, essentially a 22-car pileup. Guskiewicz persuaded the owners to move up kickoffs to the 35-yard line, ensuring more touchbacks and fewer collisions. Sure enough, concussions on kickoffs dropped 43 percent, according to the league.

Guskiewicz wasn't paid to serve the NFL. His day job was still at the University of North Carolina, where, after he received the MacArthur genius grant, his meteoric rise continued. Long after his start as an ankle-taping apprentice for the Pittsburgh Steelers, Guskiewicz, still exuding a self-effacing boyishness, now chaired the university's department of exercise and sports science. He ran the Center for the Study of Retired Athletes, which he cofounded with Bailes, and the Matthew Gfeller Sport-Related Traumatic Brain Injury Research Center, named after a North Carolina high school player who died from a collision on the field.

But the NFL gave Guskiewicz everything he needed to fulfill his duties for the league. When he needed "big dollars," he said, he would seek out Jeff Pash, the NFL's number two executive, and say, "Jeff, we need to buy six new systems, and it's going to cost \$250,000 to install; can you authorize the purchase? And Jeff then does that." The NFL insisted that its new concussion committee—like its old concussion committee—was totally independent, yet the league monitored interviews and filtered communication with the media. Guskiewicz and his colleagues reported directly to Goodell, who came to North Carolina in March 2013 to lecture on football and safety.

People noticed Guskiewicz's transformation. Matt Chaney, a con-

ussion blogger highly critical of the league, satirized him as "Gus Genius" and wrote that he "epitomizes the wily football-funded researcher, morphing from game critic to advocate committee member. The NFL specializes in buying off such pliable 'experts.' Kevin Guskiewicz is no genius; he's just become another football insider of unearned credit and privilege." The blogger Irv Muchnick started calling Guskiewicz "Dr. No Jr."

The most bizarre aspect of Guskiewicz's new role was that he found himself working with Elliot Pellman, his former scientific nemesis, who continued as the NFL's medical director and even attended committee meetings. How Pellman survived baffled even Guskiewicz. "It's a question that many of us have asked," he said. "I mean, I really don't know." Another league-affiliated doctor, half joking, said he assumed Pellman "has incriminating photos hidden somewhere." Pellman, of course, was a walking repository of information about the NFL's concussion policies; the most obvious explanation was the lawyers wanted to keep him close. Guskiewicz said he didn't mind as long as Pellman stayed as far away from him as possible. He said his only interaction with the NFL's medical director was to send him his receipts to get reimbursed for his travel expenses.

Guskiewicz said the former head of the Mild Traumatic Brain Injury Committee was adept at processing his breakfast receipts.

"He does it really well," Guskiewicz insisted. "I have to tell you, if only the university could reimburse me as quickly as he does; it's usually within minutes and the check's in the mail. But I know, it's comical."

There was something poignant about Guskiewicz's ongoing research. He was trying to make a violent game safe. His latest work involved helmet sensors that measured the magnitude and frequency of blows. One of Guskiewicz's sons was playing high school football. On Friday nights, on a glowing field like thousands all over the country—the field where his son played—Guskiewicz watched his sensors pick up one collision after another, play after play after play.

Guskiewicz loved football. He had loved it ever since he had ridden his bike to watch his heroes, men such as Mike Webster and Terry Bradshaw and Mean Joe Greene, from the hill overlooking the Steelers' training camp in Latrobe. The game was part of him, part of his

American story. That's the thing about football, why it's different from cigarettes and coal dust and not wearing your seat belt and a whole range of other things that have been proved bad for us. We love football. Americans by the millions are complicit in making the sport what it has become, for better or worse. The outcome of the NFL's concussion crisis will affect the country. But it will be determined not by the "enemies" or "opponents" of football but by those in love with the sport: the players, the fans, the advertisers, the book writers, the moms and dads and kids. Even the scientists.

Guskiewicz didn't believe his views had changed. He thought the pendulum had swung too far since his studies, before we really know how many people get brain damage from playing football, or how exactly that occurs, or what the true risks are. McKee, for all the publicity surrounding her work, for the many brains she'd examined, had not established "a cause and effect relationship" between football and neurodegenerative disease, Guskiewicz said. Her insistence that she had, and the insistence of others, such as Omalu, Cantu, and even Bailes, had created an unwarranted backlash against the NFL, he thought. "Some of them are beating their fists on the table a little harder than others to say, I'm convinced this exists," Guskiewicz said. "I mean, if it existed to the extent that some people have said, we would have an epidemic on our hands. And I don't think that we have an epidemic."

The Center for the Study of Retired Athletes had evaluated more than 400 NFL players. "I hope that I look as good as three-quarters of them when I'm 55 or 60," said Guskiewicz. "So it's not happening to everybody. There is certainly a quarter of them that need some help, and we've got to figure out how we intervene. But as I've said, three-quarters of them look really pretty good. And I don't think we have a bias. I think we're seeing the typical player walk through our door."

By 2013, the NFL was spending tens of millions of dollars—spread among leading physicians and institutions throughout the country—to become the main sponsor of research that holds the potential of its own undoing. Nearly every prominent scientific group involved in that work—Boston University, the National Institutes of Health, the University of North Carolina—has benefited from the NFL's riches. Does that mean that all the science is tainted or that Kevin Guskiewicz was

bought? No. Does it make the research independent and credible? Time will tell.

But once again, the NFL was in control of the science of concussions.

That wasn't just Guskiewicz. As the league moved into this murky next phase, it was often hard to tell where people stood and whether anything had changed.

Merril Hoge, who retired from the NFL in 1994, the Season of the Concussion, because he couldn't remember his daughter's name and briefly went blind, claimed that football was no more dangerous than riding a bike, an assertion the NFL made repeatedly. Hoge was a board member of USA Football, an organization endowed by the league and identified as the "official youth football development partner of the NFL." He espoused the league's message of teaching proper tackling to take the head out of the game, a concept many players thought impossible and almost laughable.

Hoge used his role as an NFL analyst on ESPN to criticize those who would question the dangers of football. When former quarterback Kurt Warner, who led the Rams to victory in Super Bowl XXXIV and won two MVP awards during a 12-year career, said he would prefer that his sons not play football, remarks similar to those made by former greats such as Bradshaw and Carson, Hoge publicly attacked Warner as "irresponsible" and "uneducated."

Some people seemed to be lining up on both sides of the debate. Cantu, another original Dissenter, now was serving as a senior adviser to the NFL concussion committee. At the same time, he dispensed paid advice to the lawyers suing the league during a February 2012 strategy session in Philadelphia. When the NFL found out about his appearance, league officials sent a warning letter to the lawyers to stay away from Cantu because he worked for them. After discovering Cantu's conflicting roles, the lawyers for the players decided he was tainted as an expert witness and backed away.

The lawsuits, including the first one filed by Jason Luckasevic and his colleagues, had been consolidated into one "mass tort" involving nearly 6,000 former players or their families. That included Bubby Brister, whose long-ago concussion with the Steelers led to the

creation of ImPACT and neuropsychological testing in the NFL. It also included the relatives of Junior Seau. Twelve days after the NIH announced that Seau's brain was riddled with CTE, his family sued the NFL. The Seaus alleged that the league "deliberately ignored and actively concealed" the risks of chronic brain damage "from the players, including the late Junior Seau."

By the time the two sides appeared in court in April 2013 for a hearing on the NFL's motion to dismiss the case, Luckasevic and the others had given way to David Frederick, a Washington superlawyer who once clerked for Supreme Court Justice Byron "Whizzer" White, the former star half-back. The NFL was represented by Paul Clement, a former U.S. solicitor general. Both men had argued numerous cases before the Supreme Court. It didn't escape notice that the NFL's chief outside counsel, Covington & Burling, was a veteran of the tobacco wars, one of two law firms—the other was Shook, Hardy & Bacon—that served as "guiding strategists" for Big Tobacco. Before taking over as commissioner, Tagliabue worked as the NFL's lawyer for the powerhouse firm, but it's not known whether he played a role in the tobacco strategy. After retiring as commissioner, he returned to Covington & Burling, where he serves as a senior counsel as part of the firm's Strategic Risk and Crisis Management Team.

For decades, Covington & Burling's lawyers directed litigation, public relations, and opposition research against those who warned against the dangers of smoking. The firm served as the first legal counsel for the Tobacco Institute, which produced industry-friendly research. It helped draft a more lenient liability law, coordinated denials about the dangers of secondhand smoke, and subsidized tobacco-friendly scientific witnesses who were referred to as "whitecoats." In 1987, after the surgeon general concluded that secondhand smoke caused cancer and respiratory disease, Covington & Burling partner John Rupp famously told a group of tobacco executives they were "in deep shit."

Now, in the looming brain wars, the NFL's insurers were warning that the league could face \$2.5 billion in damages if it lost its battle with the players. After a federal judge ordered the two sides to mediation, a settlement was announced just one week before the start of the 2013 season. The league agreed to pay \$765 million, plus legal fees that were expected to run another \$200 million. It was seen by many as a victory

for the NFL. There would be no public vetting of what the league knew and when it knew it. No Paul Tagliabue testifying in open court about why on earth he had appointed a rheumatologist to lead a concussion committee. No Dr. No. And that \$765 million? It was widely regarded as chump change. As Kevin Mawae, the former president of the NFLPA, tweeted: "NFL concussion lawsuit net outcome? Big loss for the players now and the future! Estimated NFL revenue by 2025 = \$27 BILLION."

It had been three years since the NFL's chief spokesman had said it was "quite obvious" that football-related concussions "can lead to long-term problems." No one from the league had uttered a word about that since.

In December 2012, Goodell gave a lecture at the Harvard School of Public Health. He was introduced by the dean, Julio Frenk, who noted that the dangers of secondhand smoke were first identified at Harvard. For 37 minutes, Goodell hit on the NFL's new talking points: Safety is its number one priority; concussions are not confined to football; the league has made rule changes to reduce concussions and is promoting "independent and transparent medical research."

The commissioner emphasized the need to rely on "science and facts, not speculation." He cited a recent study by the National Institute for Occupational Safety and Health (NIOSH) debunking the myth that NFL players had shorter life spans than the general population. He did not, however, note another NIOSH study suggesting that NFL players were four times more likely to develop Alzheimer's or Lou Gehrig's disease.

As he ended his day at Harvard, Goodell took a few questions from the media before being whisked away.

"Is the league's position clear that football has the potential to cause long-term brain damage?" he was asked.

The commissioner hit replay: "What we are doing is making sure that we do everything to make sure that the game is safe. Those conclusions have to be drawn by the medical community."

Seven months later, as training camps prepared to open for the 2013 season, incoming rookies attended a three-day symposium staged by the NFL. On the second day, Cleveland Browns team doctor Mark Schickendantz gave a presentation about health and safety. In a 2011

incident that drew national attention, Schickendantz, an orthopedic surgeon, was among the medical professionals who cleared quarterback Colt McCoy to return to action without receiving a sideline concussion test, despite taking a brutal helmet-to-helmet hit from Steelers linebacker James Harrison. Now, Schickendantz was educating the 2013 rookie class about the dangers of concussions. According to a story in the *Washington Post*, he said, "It's never an insignificant injury. . . . Don't hide it." He discussed the league's new assessment protocols, including the addition of independent neurologists on the sideline.

But as he wrapped up his presentation, Schickendantz told the young players, "Right now, we're learning a little bit more about long-term brain damage." And he added, "No direct cause and effect has been established yet."

Jim Otto wears a silver-and-black sleeve with the Oakland Raiders' logo over his prosthetic right leg.

Otto played center for the Raiders for 15 years. When he first arrived in the San Francisco Bay Area in 1960, he was still carrying around the leather football helmet he had worn at the University of Miami, which couldn't find a plastic one big enough to fit over his size 8 head. Back then, Otto was just 205 pounds and had been passed over in all 20 rounds of the NFL draft. Only the Raiders, the eighth and final team cobbled together to form the American Football League, the newly created rival of the NFL, gave him a shot.

By the time Otto retired, in 1974, the two leagues had merged and the modern NFL had been born. Otto had established himself as one of the finest offensive linemen in the history of the game. "Double O"—his nickname and his number—was the ultimate Raider, at one point starting 210 straight games. He came to see himself as a descendant of the Roman gladiators and "proudly wore the scars of a gladiator." When his helmet cut a gash in the bridge of his nose, he let the blood trickle down his face and smeared it on his jersey. Off the field, Otto was a pleasant-looking man with a crooked smile and a shock of blond hair that he grew longer with the times. On the field he was terrifying: He seemed to age 10 years just cramming the helmet onto his head. Wayne Walker, the Detroit linebacker, said peering through Otto's face mask

was "like looking at a gargoyle." Otto got his bell rung so often playing center, his legs churning like pistons as he drove his head into his opponent, that his teammates chanted *ding, ding, ding* when he staggered back to the huddle. By the time he was 28, Otto's teammates were calling him "Pops," partly out of deference to his seniority as an original Raider and partly because of the quickening destruction of his body. He titled his autobiography, written with *Oakland Tribune* columnist Dave Newhouse, *Jim Otto: The Pain of Glory*.

Otto's retirement ushered in an era he referred to as his "middle-aged horror show."

He got his first artificial knee two years out of the game. His shoulders were replaced. Doctors fused and re-fused the vertebrae in his back. His knees caused him a kind of perpetual torment: The replacements wore out or failed to take; horrible infections developed. By the mid-1990s, Otto's right knee had been replaced six times, his left knee twice.

In 2007, doctors concluded that Otto's right knee would probably end up killing him. They decided to remove his leg below the thigh. On the first attempt, they failed to catch all of the infection and decided to amputate further, taking off another chunk of his thigh. Otto spent most of the year in a Salt Lake City hospital. The pain was unbearable: He cried and begged for stronger medication, which made him delusional. He saw people dancing outside his window. One night he woke up and became aware he was standing naked in the hallway on his remaining leg. Another time he fell between the toilet and the wall and screamed in vain for help. Doctors strapped him to his bed, and monitors were assigned to his room. His wife, Sally, brought a plaque that said "Miracles Happen," and Otto believes that's what saved him. The plaque now hangs in the bedroom of their sprawling ranch-style house in Auburn, California, on the way to Lake Tahoe from San Francisco.

At 75, Otto is still blessed with an ornery resilience. "If I had a leg, I'd still be out kicking ass," he said one afternoon. He experienced "tremendous" headaches that felt like someone had hit him with a bat. "I had a spike go through here just a minute ago," he said at one point. Like dozens of other players, he was getting treatment for his brain injuries at the Amen Clinic in Southern California, which he thought helped. People had approached him about joining the lawsuit, but he refused. As

he wrote in *Jim Otto: The Pain of Glory*: "I'm not a wimp-out. Nobody told me I had to play every week. So I'm not going to sue my former team like other retired players. I'm simply not made that way."

"I take responsibility for everything that happened to my body," he said, falling into a chair in his den one afternoon. When Otto first began in professional football, he made \$300 a game. One of his first Raiders paychecks bounced. The NFL, he said wistfully, is "the greatest success story ever in sports. I mean, I would have played for a pat on the back and a bottle of Budweiser after the game and a sandwich, you know? The only thing I'm regretting is that nobody in the NFL has even recognized the fact that I've lost my leg. Nobody has even called me. Someone could have said, 'Boy, Jim, I'm sorry that happened to you.'"

Otto grew up in Wausau, Wisconsin. His father ran deliveries for a meat company and operated the Tidee Didee Diaper Service with Otto's uncle. Otto had viewed football as a means of recognition for a poor boy—"little Jimmy Otto really cleaned somebody's clock"—an escape from the harsh northern Wisconsin winters and the life he foresaw for himself as a welder.

When Otto was established in the NFL, he made a trip back home to rural Wisconsin. One day a high school player came up and introduced himself. He told Otto that he was from a little town near Rhinelander, about an hour north of Wausau. He said he wanted to be just like him. The boy was small for a lineman, stocky and blond. He could have been Otto's little brother. The boy asked Otto for some tips and told him that he, too, planned to play in the NFL someday.

"Great, I'll be looking for you," Otto said.

Now, several years later, in one of his final games as a Raider, two of Otto's linemates, Gene Upshaw and Art Shell, started razzing him.

"Mr. Otto! Oh, Mr. Otto, there's somebody looking for you!" they said.

Upshaw and Shell pointed over to the opposing sideline. A player was trying to get Otto's attention. It was the same boy, now dressed in black and gold.

"Mr. Otto! Mr. Otto!" yelled Mike Webster. "I made it!"

AFTERWORD

Seven weeks before the publication of this book, in the fall of 2013, we received a call from Chris Buckle, the investigations editor at ESPN.com, and Dwayne Bray, who oversees the unit that produces investigative pieces for the network's hard-hitting television program *Outside the Lines*. Chris and Dwayne are our close friends, as well as our editors, so it came as something of a surprise, if not mild shock, when Dwayne informed us that he would be reading a statement over the phone and that neither he nor Chris would be able to take questions.

In the previous 18 months, *League of Denial*, which began as an idea to write a book chronicling the history of the NFL's concussion crisis, had morphed into something more ambitious. *Frontline*, the award-winning PBS investigative series, had signed on to produce a documentary based on the book. ESPN joined as a partner in the project. The result was an extraordinary amount of journalistic firepower trained on the NFL. The ESPN-*Frontline* partnership would generate nine in-depth stories that appeared on TV and the web, including the macabre, cross-country saga of Junior Seau's brain, which appears in greater detail in Chapter 17, and the disclosure that the NFL had been handing out millions of dollars for crippling brain injuries even as the league was denying that football causes brain damage, as revealed in Chapter 9.

The partnership also produced several kumbaya moments celebrating the power of journalism. One took place in a ballroom at the Beverly Hilton hotel that August as PBS, along with the other networks, previewed its fall season. On the same stage where Lady Edith and Lady Mary discussed the plot twists of *Downton Abbey*, we joined a panel to talk about football and the human brain, along with Dwayne, Hall of Fame New York Giants linebacker Harry Carson, and Mike Kirk, who produced and directed the documentary. The highlight was the unveiling of the film's trailer, which set two minutes of NFL violence to a soundtrack of Rihanna singing hauntingly:

*Feel it coming in the air
Hear the screams from everywhere
I'm addicted to the thrill
It's a dangerous love affair*

The trailer concluded with Ann McKee, the neuropathologist, stating, "I'm really wondering where this stops. I'm really wondering if every single football player doesn't have this."

When the session ended, we all patted ourselves on the back and looked ahead to the simultaneous launch of the book and the film. In hindsight, it seems hopelessly naïve not to have anticipated that the Hollywood-style unveiling of a film titled *League of Denial* might draw the ire of the people who run the \$10 billion corporation to which the title referred. And that those people might direct their ire at the network that was, awkwardly, one of the corporation's main business partners, a coproducer of the offending film, and our employer.

The call from Dwayne and Chris came 19 days later. Both were obviously crushed. The statement that Dwayne was compelled to read informed us that ESPN had dropped its partnership with *Frontline*, including the removal of the network's logo from the film. The stated reason was that ESPN had no editorial control over the final product.

The *New York Times* soon presented a parallel narrative: ESPN's withdrawal had come one week after a contentious lunch that included NFL commissioner Roger Goodell and ESPN president John Skipper, according to people with knowledge of the meeting. "The meeting was combative, the people said, with league officials conveying their irritation with the direction of the documentary," the *Times* reported. ESPN's ombudsman, respected former *Times* sportswriter Robert Lipsyte, reported that Skipper made the decision after consulting with lawyers at Disney, ESPN's parent company.

Inside our unit at ESPN, some of us took to calling the event The Implosion. Within minutes of the network's announcement that it was ending the partnership, a *Frontline* editor painstakingly scrubbed all ESPN branding from previous stories and publicity posts related to *League of Denial* and the partnership. Within days of the call from Dwayne and Chris, we flew from San Francisco to Bristol, Connecticut, ESPN's headquarters, to meet with our editors. As astonishment and

then anger swept through the investigative unit, one of our colleagues asked, "Are you guys gonna resign?"

But it was never that clear-cut. For nearly two years ESPN had supported, funded, and published the material that ultimately went into *League of Denial*. With nearly every story, the NFL had pushed back—at us, at our bosses, at our bosses' bosses. No one had changed a word. Now the impression was that ESPN had caved to pressure from the league. And yet, despite the public announcement and the firestorm, the partnership lived on in the book and the film, both utterly unchanged.

If the NFL's strategy was to derail *League of Denial*, it was obvious by the time the book and the documentary were released that it had backfired: The publicity drew even more attention to the project, especially the film, which drew ratings 47 percent higher than the average *Frontline* program. ESPN ran two separate nine-minute excerpts from the documentary on *Outside the Lines*, a 5,000-word excerpt from the book was published in *ESPN The Magazine* and on ESPN.com, and our faces were basically plastered all over the network during a series of interviews.

There's a lesson in here somewhere. As the Internet continues to transform journalism, killing newspapers, magazines, and other once-lucrative print products, the most expensive forms of reporting—investigative, explanatory, foreign—are falling by the wayside. To sustain that work in some form means it has to be subsidized—by billionaire philanthropists, by the U.S. government, by Viewers Like You. For its vast ocean of sports content—talk shows, draft previews, injury reports, and, of course, the thousands of games—ESPN also has developed perhaps the largest investigative reporting unit in the country. The unit could not survive on its own. In effect, it is subsidized—irony of ironies—by the riches of the National Football League.

Between 2010 and 2012, Pop Warner, the nation's largest youth football program, saw an exodus of 23,612 players. The 9.5 percent drop in participation is believed to be the largest in the organization's 85-year history.

Pop Warner's medical director was none other than Julian Bailes, the former Pittsburgh Steelers neurosurgeon, who still kept a woodpecker

skull on his desk as a reminder of the stakes. It was clear to Bailes what was going on: Joe Maroon's long-ago warning to Bennet Omalu—*If only 10 percent of mothers in America begin to conceive of football as a dangerous game, that is the end of football*—was becoming a reality. Bailes, whose 10-year-old son Clint played Pop Warner in suburban Chicago, was certain that concerns about head injuries were “the number one cause” for the drop.

The trend, of course, did not escape the attention of the NFL. Fortunately, the league had an answer: The head would simply be removed from the sport.

The NFL would accomplish this feat through a \$1.5 million initiative the league called Heads Up. The five-part tackling technique taught young players to keep their heads up and lead with their shoulders. “You have to be tough to play football, but no one has a tough brain,” explained Stanley Herring, a Seattle Seahawks doctor and a member of the NFL’s reconfigured concussion committee, in a promotional video for the program. “And so the right thing to do is take the head out of the game.”

The NFL spread the gospel of Heads Up through USA Football, the league’s youth arm. NFL teams hosted dozens of seminars for coaches and parents. NFL players and coaches touted the program online and in commercials. The league recruited 100 former players as Heads Up “ambassadors” to youth leagues in every state. Goodell was front and center, promoting Heads Up and its slogan, “For a Better, Safer Game.” During the 2013 season, the NFL and the Chicago Bears hosted a Moms Football Safety Clinic at the Bears facility in Lake Forest, Illinois. Some 200 mothers were trained in Heads Up tackling. The clinic was held just one week after an HBO *Real Sports/Marist Poll* revealed that one third of adults said they were “less likely” to let their kids play football because of concerns over head injuries.

Goodell described the challenges faced by parents as nothing new: “My mom went through the same thing. I played nine years. I wouldn’t give up a single day of that. Moms were always rightfully concerned about their children, but there’s never been a safer time to play football.” The commissioner called Heads Up a program the NFL “created this year to teach kids how to better tackle.” His wife, Jane Skinner, a former

Fox News anchor, also weighed in, telling the assembled mothers, “I was talking with one of my favorite neurosurgeon friends today . . . and he said he had a message for all of you tonight. He said, ‘I can tell you, your kids are more likely to get injured on their bike going to sports practice than they are on the sports field.’”

There was no scientific evidence to support the assertion that Heads Up reduced the potential for concussions. Nor was there evidence that the head could somehow be removed from play.

To Nate Jackson the whole thing was preposterous. Jackson had spent six injury-plagued seasons with the Denver Broncos, primarily as a special teams player. Upon retiring, he penned a memoir called *Slow Getting Up: A Story of NFL Survival from the Bottom of the Pile*. Jackson described Heads Up’s tackling techniques as “laughable”—an unrealistic approach for players moving at high speeds and colliding from different angles. This, he said, would be true at all levels, and anybody who ever played should understand that.

Jackson called Heads Up “a product that the NFL is selling” to “create the illusion that the game is safe or can be made safe. It’s rather shameless. I think it’s sad. I think it’s indicative of what the league’s motives are: profit, profit, profit.”

Asked what he would say to parents who had been told their children’s heads were going to be taken out of harm’s way, Jackson replied, “I would say, ‘You’re being lied to.’”

In April 2014 the NFL gave USA Football \$45 million to support Heads Up and other youth programs. In its first year, Heads Up was adopted by more than 2,700 youth leagues. With the grant, USA Football would have the funds to pursue its goal of reaching 10,000 youth football leagues across the country.

When the \$765 million concussion settlement was announced on the eve of the 2013 season, its proponents argued that it was the quickest way to help aging former players, many of whom urgently needed the money. The players might be dead before they ever saw a dime if they held out for a better deal, the argument went.

But as the season—and another offseason—passed, it became clear that it would probably be years before the NFL was forced to

pay anything. It didn't take long for players and lawyers to start doing the math, and one immediate question was whether there was enough money in the deal to cover all the neurologically crippled NFL retirees out there.

Hundreds were scraping by on workers' compensation or disability benefits, as well as the relatively meager allocations of the 88 Plan. In theory, all those players or their relatives would be eligible for the maximum benefits outlined in the settlement: \$3 million for dementia, \$4 million for CTE, \$5 million for ALS. The dollars added up quickly. At least 251 former players had been diagnosed with dementia or ALS, according to the league and the players union. Combined with the 59 confirmed CTE cases, it appeared that retired players and their relatives could collect more than a billion dollars, vastly exceeding the settlement amount.

"I'm trying to figure out how the math works," said Brent Boyd, the outspoken former Vikings lineman.

The NFL and the colead counsel for the players, Chris Seeger, promised there was plenty of money to go around. Seeger said a team of actuaries and economists had done the projections and guaranteed everything would be fine. But Seeger was unable to convince the federal judge overseeing the case, Anita Brody. She rejected the first attempt to get the settlement approved because she, too, wasn't sure there was enough money. "I am primarily concerned that not all retired NFL football players who ultimately received a qualifying diagnosis or their related claimants will be paid," she wrote in denying the request to approve the settlement.

Brody asked the NFL and Seeger to produce the actuarial data that was key to the deal. Seeger promised he would make it public. But nine months after the settlement was announced, still only a select few had seen it; many, in fact, wondered if the NFL was trying to keep the actuarial data from getting out for as long as it could, for the data no doubt included the league's own estimates about how many of its players would come down with the same disease that had turned Mike Webster and many others into raging and delusional madmen.

That was one more thing about the settlement: Iron Mike, the man who started it all, didn't qualify. The negotiators set a cutoff date of

2006, arguing that the statute of limitations in most states prevented wrongful death claims going back any further. Any player who died earlier was ineligible; their relatives couldn't collect a penny. It was the last indignity to the Webster family, whose battles with the NFL had now lasted nearly as long as Webster's Hall of Fame career. Pam Webster couldn't believe it; when she heard the news, she cried.

And then she and Sunny Jani, Webster's former caretaker and the man who rescued him from a bus station, along with rest of Team Webster, sued the NFL, again.

By the spring of 2014, Ann McKee was still very much in the game. The NFL had kept McKee from studying Junior Seau's brain and had reneged on its deal to direct the brains of dead football players to BU, but that hadn't stopped the flow of cases. So much had changed for McKee in the seven years since she had become the face of CTE research, but the one constant was that she kept finding florid disease in the brains of dead football players. In the fall of 2012, during one of our first interviews with McKee, she said she'd examined the brains of 34 ex-NFL players and found CTE in 33 of them. Now, less than two years later, the number had nearly doubled—McKee, tragically, was 59 for 62.

McKee was receiving funding through the NFL's \$30 million donation to the NIH, though that was perhaps not by the league's design. Of that money, \$12 million had been steered toward CTE studies; one component was to confirm McKee's earlier work. McKee thought it was repetitive but necessary, "a huge opportunity" not only to validate her work but also to extend its reach. She recognized, of course, that given the NFL's involvement—it wasn't so long ago she had called the league's researchers "delusional"—there were political undercurrents to the funding.

"Let me just say that I never forgot about the politics," she said.

For all its resistance, the NFL also was very much in the game. In one year alone the league announced that it would donate at least \$50 million to science, much of it focused on the kind of concussion-related studies it once ridiculed. The NFL had emerged as perhaps the leading force in the country, if not the world, in the study of traumatic brain

injury. For years scientists had to beg for money to study the brain; now an industry with \$10 billion in annual revenue was handing out checks liberally. To some it was a reflection of the NFL's reinvigorated effort to protect its players—Goodell repeatedly called this the league's top priority. But to many who knew the history, the NFL's strategy was troubling.

"The reality is you can't put this in the hands of the NFL to govern," said Michael Oriard, the former Chiefs offensive lineman who became an English professor at Oregon State and an NFL historian. "Even with the best possible intentions, the corporate NFL has its needs and interests. You don't let the tobacco industry regulate what's safe in terms of smoking."

For five years Goodell had been repeating his mantra—"We're going to let the medical people decide"—when asked about the connection between football and brain damage. But none of the NFL-funded research seemed designed to help the medical people decide. The research tended to focus on the general population and not those most directly impacted by the NFL's product: football players. Nor did the research begin to answer the most fundamental question, the one on the minds of parents, fans, and an increasing number of players: What is the actual risk of playing America's most popular sport?

Even the \$30 million grant to the NIH came with strings attached. No one questioned the NIH's independence. And yet, the NFL could tell the NIH how it *didn't* want its money spent. And by partnering with NIH, the league had picked an organization prohibited from targeting a specific group for study. In other words, the NFL had given \$30 million to an agency that wasn't allowed to study football players exclusively.

This point provoked a battle between the owners and the players union over how the league would spend its vast resources. When the two sides signed a new collective bargaining agreement in 2011, they agreed to donate \$100 million to medical research. But from the beginning, the owners and the players were divided on how the money should be allocated. The league proposed giving all \$100 million to NIH. But this was a nonstarter for the union—the football players wanted the research to be focused on football players.

Some researchers believed the NFL was trying to avoid certain

results. One, Eric Nauman, a professor of biomedical engineering at Purdue, had made progress showing how "sub-concussive hits"—the kind that occur at the line of scrimmage on every down—degrade the brain over time. But Nauman couldn't get funding from the league.

"I get the sense that there's some influence over what they'd like to find or what they wouldn't like to find," Nauman said. "The NFL, they're not necessarily in the business of the public good, they're in *their* business. So I can understand why they might not be pushing some of the research."

Perhaps most telling was the research that wasn't being conducted. The one piece of information most relevant to football's future was the percentage of players expected to get brain damage. There were some ominous numbers out there (none more than McKee's 59 out of 62). But McKee admitted her figures were skewed; all the players had been symptomatic before they died. She knew that nothing could be said definitively until players—healthy and diseased—could be tracked over the lengths of their careers and beyond. That kind of longitudinal study would cost tens of millions of dollars; \$100 million might do the trick.

The league knew this. The players knew this. The scientists knew this. And yet, as of this writing, there was no such study in the pipeline.

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Phil Bennett, the outgoing managing editor of *Frontline* and former managing editor at the *Washington Post*, turned our modest project into

something vastly more ambitious: not only a book but also a two-part documentary film and a yearlong reporting partnership, with stories published simultaneously by ESPN and *Frontline*. Phil also read drafts of the manuscript and made improvements in every chapter, a kind of editing magic he generously has performed on Steve's copy for nearly 20 years. We also are immeasurably grateful to Sabrina Shankman, whose reporting for the film and the book thoroughly enriched both. Thanks also to *Frontline*'s Michael Kirk, Jim Gilmore, Mike Wiser, Lauren Ezell, Colette Neirouz Hanna, Raney Aronson, David Fanning, Pam Johnston, Patrice Taddonio, Tom Jennings, Travis Fox, and Caitlin McNally.

Alan Schwarz blew open the concussion story with three years of relentless reporting in the *New York Times*. Alan embraced our book from the beginning and shared some of his previously unpublished research, along with his own backstory. Julie Tate constructed a database of all the plaintiffs in the growing lawsuit against the NFL, excavated useful documents, and, in the end, held us accountable. Kevin Fixler and Jordan Conn provided dogged research on a variety of topics, including the history of the helmet and the marketing of NFL violence. David Maraniss gave us one huge research tip early on that made our lives considerably easier. The esteemed photographer Brad Mangin somehow managed to make us look presentable, and he also provided two superb shots for the insert. We are thankful to all.

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Mark: Unending thanks to my wife, Nicole, and my kids, Max and Ella. I will never be able to fully express how lucky I am to be living amongst such a loving, supportive, smart, and funny family. Also, I'm grateful to all my in-laws and nephews and nieces—Sylvie, Oliver, Amelie, Isae, Doug, Duncan, Ariel, Luanne, Kyan, and Jocelyne. Thanks to Glenn Schwarz and Ron Kroichick, who endured book talk for months on end during our regular "mayo" lunches and never wavered in their interest and support. Thanks to my dear friend Michael Heenan, who ushered me through my internal challenges with a remarkable sense of understanding. Thanks to Lance Williams, who taught me so much about reporting and whose friendship I cherish. Thanks to T. J. Quinn, who understands it all. And thanks to my hermano, an extraordinary journalist, for this incredible journey; the ride has been wild yet fulfilling, and I'm so grateful we took it together.

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SOURCE NOTES

This book was built on a foundation of more than 200 interviews conducted in 2012 and the first half of 2013. The interviews took place throughout the United States; one or both authors made six separate reporting trips to Pittsburgh, the epicenter of the NFL's concussion crisis. Among the principal characters who agreed to participate, most were interviewed on more than one occasion.

We also benefited greatly from thousands of documents, including previously unpublished medical records, NFL memorandums, letters, and personal e-mails that were provided to us by various sources. We also reviewed court records, congressional testimony, medical journals, and a large body of research on the NFL and concussions that preceded our work, in some cases by several years.

A handful of journalists provided critical early reporting that raised awareness of this issue and highlighted the struggles of retired NFL players facing mental disabilities. They include Alan Schwarz, whose reporting for the *New York Times* forced the NFL and the medical community to confront the urgency of the concussion crisis; Jeanne Marie Laskas, whose stories in *GQ* provided the first documentation of the league's efforts to stifle Bennet Omalu; Greg Garber, whose ESPN stories foreshadowed the crisis by nearly two decades; Michael Farber, whose 1994 piece in *Sports Illustrated* was similarly prescient; and Peter Keating, whose stories for *ESPN The Magazine* and ESPN.com revealed how Elliot Pellman's Mild Traumatic Brain Injury Committee understated the seriousness of concussions.

Those journalists all made our work easier; in addition to his insights and earlier reporting, Schwarz generously provided audio recordings of previously unpublished interviews with Pellman and Ira Casson. We are deeply grateful.

We made numerous requests to interview the NFL officials who figure prominently in this story, including Commissioner Roger Goodell; his predecessor, Paul Tagliabue; and the previous leaders of the Mild Traumatic Brain Injury Committee. The NFL, still embroiled in a lawsuit involving thousands of its former players, denied those requests and declined to cooperate.

PROLOGUE

Behold the mighty woodpecker: Numerous articles have been written about the Chinese woodpecker study. See "Why Don't Woodpeckers Get Concussions?" *Toronto Star*, Oct. 27, 2011. **Displayed a woodpecker skull:** Julian Bailes interview, 2012. **During a closed-door meeting:** Multiple sources, including Bailes, provided details about the NFL's concussion conference. **The body of Mike Webster:** Information about Webster's physical condition at the time of his death is from interviews